

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : A01N 25/24, 53/00	A1	(11) International Publication Number: WO 00/03593 (43) International Publication Date: 27 January 2000 (27.01.00)
(21) International Application Number: PCT/IB99/01405 (22) International Filing Date: 14 July 1999 (14.07.99) (30) Priority Data: 60/093,221 17 July 1998 (17.07.98) US 09/228,737 12 January 1999 (12.01.99) US (71) Applicant: MAGISEAL CORPORATION [CA/CA]; 1065 Clarke Road, London, Ontario N5V 3B3 (CA). (72) Inventors: HARRIS, James, T.; 320 St. George Street, London, Ontario N6A 3B1 (CA). TANGELDER, Bernardus, M.; 180 Ardsley Crescent, London, Ontario N6G 3W7 (CA).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: FABRIC, CARPET AND UPHOLSTERY PROTECTANT WITH BIOCIDES AND ACARICIDES (57) Abstract A composition for treating a substrate to control dust mite populations thereon. The composition includes a fluoropolymer, a biocide, and an acaricide.		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon	KR	Republic of Korea	PL	Poland		
CN	China	KZ	Kazakstan	PT	Portugal		
CU	Cuba	LC	Saint Lucia	RO	Romania		
CZ	Czech Republic	LI	Liechtenstein	RU	Russian Federation		
DE	Germany	LK	Sri Lanka	SD	Sudan		
DK	Denmark	LR	Liberia	SE	Sweden		
EE	Estonia			SG	Singapore		

FABRIC, CARPET AND UPHOLSTERY PROTECTANT
WITH BIOCIDES AND ACARICIDES

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefits of U.S.
Provisional Application No. 60/093,221, filed July 17,
1998.

BACKGROUND OF THE INVENTION

This invention relates to compositions for treating
substrates, and in particular to compositions for treating
substrates to control dust mites.

Allergies to dust are common in the U.S. and Western
European countries. Many of these allergies are caused by
allergens produced by acarids present in dust, such as
Dermatophagoides farinae, *Euroglyphus maynei*, and
Dermatophagoides pteronyssinus. Such acarids are commonly
referred to as "dust mites". Two types of allergens are
produced by dust mites: Group I allergens, which are
released by dust mites via fecal pellets, and Group II
allergens which are present in the bodies of the dust
mites. It has been determined that the threshold level for
dust mite allergen sensitization is about 100-500
mites/gram.

It is known that dust mites derive their nourishment
from the dead skin, nail debris, fur, and feathers of
humans and animals (often collectively referred to as
"squamae"). Mold provides dust mites with vitamins, which
helps the dust mites digest squamae. Thus, dust mites live
in areas where abundant amounts of squamae can be found,
where the temperature is warm, where the humidity is
relatively high, and where there is little light (because
dust mites are sensitive to solar UV). Consequently, dust
mites thrive in substrates that have prolonged contact with
humans, e.g., bedding, upholstered furniture, and carpets.

1 Acaricidal compositions have been developed to treat
2 substrates. Typically, acaricidal compositions include an
3 acaricide and a carrier, such as water or an organic
4 solvent. These acaricidal compositions poison dust mites,
5 but do not reduce environmental conditions that are
6 favorable to dust mites, such as high humidity and abundant
7 food supplies.

8 Based upon the foregoing, there is a need in the art
9 for a composition for treating substrates to control dust
10 mites, wherein the composition reduces environmental
11 conditions favorable to dust mites. The present invention
12 is directed to such a composition.

13 14 SUMMARY OF THE INVENTION

15 It therefore would be desirable, and is an advantage
16 of the present invention, to provide a composition for
17 treating substrates to control dust mites, wherein the
18 composition reduces environmental conditions favorable to
19 dust mites. In accordance with the present invention, the
20 composition includes a fluoropolymer, a biocidally
21 effective amount of a biocide, and an acaricidally
22 effective amount of an acaricide. Also provided in
23 accordance with the present invention are methods of
24 treating substrates to control dust mites. The methods
25 include the step of applying a composition to the
26 substrate. In one embodiment, the composition includes a
27 fluoropolymer and an acaricidally effective amount of an
28 acaricide. In another embodiment, the composition includes
29 a biocidally effective amount of a biocide, and an
30 acaricidally effective amount of an acaricide.

31 32 DETAILED DESCRIPTION OF

33 THE PREFERRED EMBODIMENTS OF THE INVENTION

34 It should be noted that parts are parts by weight and
35 percents are weight percents unless otherwise indicated or
36 apparent. In addition, when a preferred range such as 5-25

1 is given, this means preferably at least 5 and preferably
2 not more than 25.

3 As used herein, the term "acaricide" shall mean a
4 material that kills or materially inhibits the growth,
5 reproduction, or spread of acarids, including but not
6 limited to dust mites. An "acaricidally effective amount"
7 of an acaricide is that amount that will kill or materially
8 inhibit the growth, reproduction or spread of a significant
9 number of acarids.

10 As used herein, the term "biocide" shall mean a
11 material that kills or materially inhibits the growth,
12 division, reproduction, or spread of microorganisms, such
13 as bacteria, algae, and fungi. A "biocidally effective
14 amount" of a biocide is that amount that will kill or
15 materially inhibit the growth, division, reproduction, or
16 spread of a significant number of microorganisms.

17 As used herein, the term "fluoropolymer" shall mean
18 any polymer, copolymer, or mixture of polymers, wherein
19 some or all of the hydrogens are replaced with fluorine.

20 As used herein, the term "powderizing agent" shall
21 mean a material that operates as an inert carrier to render
22 a liquid into a solid.

23 Preferably, the composition of the present invention
24 is in liquid form and is organic solvent-based. Less
25 preferably, the composition is in liquid form and is water-
26 based. Still less preferably, the composition is in powder
27 form.

28 The preferred formulation (Formulation 1) for the
29 organic solvent-based embodiment of the composition is as
30 follows:

Component	<u>Weight Percent</u>		
	Preferred	Less Preferred	Less Preferred
1. Polymer A	7.55	5 - 15	.1 - 20
2. Biocide	.25	.05 - 1	.001 - 5
3. Acaricide	.1	.05 - 3	.01 - 10

1 4. Solvent A 92.1 81 - 94.9 65 - 99.88

2

3 The preferred formulation (Formulation 2) for the
4 water-based embodiment of the composition is as follows:

5

6

Weight Percent

	Component	Preferred	Less Preferred	Less Preferred
10	1. Polymer B	2.9	2-15	.1 - 20
11	2. Biocide	.25	.05 - 1	.0001 - 5
12	3. Acaricide	.1	.05 - 3	.01 - 10
13	4. Surfactant A	1.3	.5 - 5	.1 - 10
14	5. Glycol ether A	2.5	.5 - 5	.1 - 10
15	6. Glycol ether B	2.5	.5 - 5	.1 - 10
16	7. Water	90.45	66 - 96.4	35 - 99.5899

23

24

25 The preferred formulation (Formulation 3) for the
26 powder embodiment of the composition is as follows:

27

28

Weight Percent

	Component	Preferred	Less Preferred	Less Preferred
32	1. Polymer A	7.55	5 - 15	.1 - 20
33	2. Biocide	.25	.05 - 1	.01 - 2
34	3. Acaricide	.1	.05 - 3	.01 - 10
35	4. Powderizing Agent	92.1	81 - 94.9	69 - 99.88

39

40
41 Preferably, polymers A and B prevent water and other
42 polar and non-polar liquids and soils from penetrating the
43 substrate to which the composition of the present invention
44 is applied, and also prevent the biocides A and B and the
45 acaricide from being removed from the substrate by water
46 and other liquids. The polymers A and B preferably reduce
47 the surface energy of the substrate to 16-30 dynes/cm.

1 This low surface energy prevents water and most oils from
2 wetting or spreading over or into the substrate. It is
3 believed that the low surface energy also helps prevent
4 soil, such as squamae, from adhering to the substrate.
5 Thus, the polymers A and B preferably keep the substrate
6 clean and dry, thereby making the substrate less suitable
7 for hosting dust mites.

8 Preferably, polymer A is a perfluorinated polymer sold
9 under the name Bartex AF NF by TriTex. Polymer B is
10 preferably a perfluoroalkyl methacrylic copolymer sold
11 under the name Zonyl 8740 by E.I. Du Pont de Nemours. Less
12 preferably, polymers A and B are fluorinated or
13 perfluorinated acrylics, methacrylics, styrenes, or
14 polyethylenes, or other type of fluoropolymers. Still less
15 preferably, polymers A and B are silicone polymers, such as
16 polymethylhydrosiloxane. Still less preferably, polymers A
17 and B are any other polymer, copolymer, or mixture of
18 polymers that provides a water resistant coating.

19 Preferably, the biocide is active against a broad
20 spectrum of organisms, including Gram negative and Gram
21 positive bacteria, and fungi. It is also preferred if the
22 biocide is not irritating to human skin, is not readily
23 deactivated by soil load, and is compatible with water
24 repellent polymers, such as fluoropolymers. The biocide
25 preferably reduces and prevents the growth of mold, fungi,
26 bacteria, and algae, which are potential food sources for
27 dust mites.

28 The biocide is preferably didecyldimethylammonium
29 chloride, which is a quaternary ammonium compound sold by
30 Lonza UK Ltd. under the name Bardac 22. Less preferably,
31 the biocide is another quaternary ammonium compound, such
32 as: benzyl trimethyl ammonium chloride, which is sold by
33 Rhodia under the name DMB 451; didecyldimethylammonium
34 chloride, which is sold by the Stepan Company under the
35 name BTC 1010; benzalkonium chloride, which is sold by
36 Bayer AG under the name Zephrol; benzethonium chloride,
37 which is sold by Lonza under the name Hyamine 1622; a dual

1 quaternary ammonium compound, such as a mixture of
2 myristalkonium chloride and quaternium 14, which is sold by
3 the Stepan Company under the name BTC 2125; or 3-
4 (Trimethoxysilyl)-propyldimethyloctadecyl ammonium
5 chloride. Less preferably the biocide is a mixture of a
6 quaternary ammonium compound with a phenolic compound,
7 wherein the weight ratio of the quaternary ammonium
8 compound to the phenolic compound is from 1:1 to 3:1.
9 Still less preferably, the biocide is a phenolic compound.
10 Phenolic compounds that may be used include ortho-
11 phenylphenol and its sodium salt, which are respectively
12 sold by Dow Chemical under the names Dowicide 1 and
13 Dowicide A; and pentachlorophenol, which is sold by Dow
14 Chemical under the name Dowicide 7. Still less preferably,
15 the biocide is an isothiazolin, such as 2-octyl-4-
16 isothiazolin-3-one, which is sold by Rohm and Haas under
17 the name Kathon 893; or 2-bromo-2-nitropropane-1, 3-diol,
18 known as bronopol, and sold by the Angus Chemical Company
19 and the Inolex Chemical Company. Still less preferably,
20 the biocide is another known biocide.

21 Preferably, a biocidally effective amount of the
22 biocide is used in the organic solvent-based composition of
23 the present invention and in the powder-based composition
24 of the present invention. Preferably, a biocidally
25 effective amount of the biocide is also used in the water-
26 based composition of the present invention.

27 Preferably, the acaricide significantly reduces,
28 and/or prevents an increase in, the number of dust mites
29 present in or on the substrate to which the composition of
30 the present invention is applied. It is also preferred if
31 the acaricide is not irritating to human skin, is
32 compatible with water repellent polymers, such as
33 fluoropolymers, and is effective for an extended period of
34 time, e.g. three years or longer.

35 Preferably, the acaricide is 3-phenoxybenzyl (1 RS,
36 3RS)-(1 RS, 3 SR)-3-(2,2-dichlorovinyl)-2,2-dimethyl-
37 cyclopropanecarboxylate, CAS Registry Number 52645-53-1,

1 which is a synthetic pyrethroid known as permethrin and is
2 sold by McLaughlin Gormley King Company. Less preferably,
3 the acaricide is benzyl benzoate, or another pyrethroid,
4 such as an allethrin, bioresmethrin, cypermethrin,
5 cyhalothrin, deltamethrin, or natural pyrethrum. Still
6 less preferably, the acaricide is another known acaricide.

7 Preferably, an acaricidally effective amount of the
8 acaricide is used in the organic solvent-based composition
9 of the present invention and in the powder-based
10 composition of the present invention. Preferably, an
11 acaricidally effective amount of the acaricide is used in
12 the water-based composition of the present invention.

13 The solvent A functions as a carrier in the organic
14 solvent-based composition of the present invention. The
15 solvent A dissolves polymer A, the biocide, and the
16 acaricide and carries them onto the substrate. Once the
17 composition is deposited on the substrate, the solvent A
18 quickly evaporates and leaves no residue behind.

19 Solvent A is preferably an isoparaffinic solvent sold
20 by the Exxon Chemical Company under the name Isopar G.
21 Less preferably, solvent A is an alkane, such as hexane, or
22 heptane; kerosene; mineral spirits; an alkyl benzene, such
23 as toluene, or xylene; an ester, such as ethyl acetate; a
24 hydrofluorocarbon, such as 1-H-perfluorohexane; a
25 fluorether; or another known aromatic, halogenated, or
26 aliphatic solvent.

27 Water functions as a carrier in the water-based
28 composition of the present invention. Surfactant A
29 solubilizes the biocide and the acaricide into the water,
30 while the glycol ether A and the glycol ether B help to
31 solubilize the polymer B into the water. Once the
32 composition is deposited on the substrate, the water
33 evaporates, leaving the surfactant A on the substrate.
34 Without being limited by theory, it is believed that the
35 residual surfactant traps soil onto the substrate and
36 reduces the efficacy of the polymer B. Accordingly, it is

1 important to minimize the amount of surfactant A used in
2 the composition.

3 Preferably, the surfactant A is a surfactant
4 comprising 2,6,8-trimethyl-4-nonanol with ethylene oxide,
5 which is sold by Union Carbide under the name Tergitol TMN-
6 6. Less preferably, surfactant A is another alcohol
7 alkoxylate, an alkyl phenol alkoxylate, a glucoside, a
8 sorbitan, a block polymer, an amine oxide, an amphoteric
9 surfactant, a quaternary ammonium composition, an anionic
10 surfactant, or a polymeric surfactant. Still less
11 preferably, surfactant A is another known surfactant.

12 Glycol ether A is preferably dipropylene glycol
13 monomethyl ether, which is sold by Dow Chemical under the
14 name Dowanol DPM. Glycol ether B is preferably dipropylene
15 glycol monobutyl ether, which is sold by Dow Chemical under
16 the name Dowanol DPnB. Less preferably, glycol ethers A
17 and B are other glycol ethers. Still less preferably, the
18 glycol ethers A and B may be replaced with alcohols.

19 The powderizing agent functions as a carrier in the
20 powder-based composition of the present invention. The
21 powderizing agent renders the polymer A, the biocide, and
22 the acaricide into a solid. Preferably, the powderizing
23 agent is talc, sodium sulfate, sodium carbonate, calcium
24 carbonate, or other carbonate. Less preferably, the
25 powderizing agent is another known powder carrier.

26 Polymer A, the biocide, the acaricide, and solvent A
27 are blended together using customary and known methods to
28 form the organic solvent-based composition of the present
29 invention. Preferably, the temperature during blending is
30 maintained at ambient temperature, i.e., @ 70°F.

31 Polymer B, the biocide, the acaricide, surfactant A,
32 glycol ether A, glycol ether B, and the water are blended
33 together using customary and known methods to form the
34 water-based composition of the present invention.
35 Preferably, the temperature during blending is maintained
36 at ambient temperature, i.e., @ 70°F.

1 Polymer A, the biocide, the acaricide, and the
2 powderizing agent are blended together using customary and
3 known methods to form the powder-based composition of the
4 present invention. Preferably, the temperature during
5 blending is maintained at ambient temperature, i.e., @
6 70°F.

7 Preferably, the organic solvent-based and water-based
8 compositions of the present invention are applied to a
9 substrate using a pump-type sprayer. Less preferably, an
10 aerosol sprayer may be used, which is typically in the form
11 of a steel can. Aerosol propellants, such as isobutane, or
12 CO₂, are used in the aerosol sprayer to dispense the organic
13 solvent-based and water-based compositions. Known
14 corrosion inhibitors may also be included to prevent
15 corrosion of the steel can.

16 The powder-based composition of the present invention
17 may be applied to a substrate from a bottle, box, can, or
18 other container, which is preferably provided with a
19 dispenser, such as a grate, or a plurality of apertures.
20 The powder-based composition is applied by shaking,
21 sprinkling, and/or rubbing the powder composition into the
22 substrate.

23 The composition of the present invention may be used
24 on any substrate upon which, or within which dust mites may
25 be disposed, or through which dust mites may pass. Such
26 substrates include, but are not limited to, textile fibers
27 (or filaments), fabrics, clothing, carpets, rugs,
28 upholstery, furniture, bedding, mattresses, pillows,
29 curtains, and couches.

30 The composition of the present invention provides many
31 advantages. When applied to a substrate, the composition
32 kills dust mites that are already present on the substrate,
33 as well as dust mites that later contact the substrate. In
34 addition, the composition keeps the substrate clean and
35 dry, and kills bacteria and fungi, thereby reducing food
36 sources available to dust mites, which helps reduce the
37 population of dust mites already present on the substrate

1 and discourages migration of dust mites to the substrate.
2 In this manner, the composition is both reactive and
3 preventative in terms of controlling dust mites.

4 The following Examples further illustrate various
5 aspects of the invention. Unless otherwise indicated, the
6 ingredients are combined using methods known in the art or
7 as described above.

8

9 Example 1

10 A test was performed to measure the efficacy of the
11 organic solvent-based and water-based compositions of the
12 present invention in controlling *Dermatophagoides farinae*
13 (commonly known as the "American house dust mite") on a
14 carpet substrate.

15 An organic solvent-based composition was prepared in
16 accordance with Formulation 1 by blending 7.55 parts of
17 Bartex AF NF (perfluorinated polymer), 0.1 parts of
18 Dowicide 1 (orthophenyl phenol), 0.1 parts of permethrin,
19 and 92.25 parts of Isopar G (isoparaffinic solvent). The
20 composition with the foregoing formulation shall be
21 referred to in this Example 1 and in Examples 2 and 3 as
22 the "Solvent Inventive Composition".

23 A water-based composition was prepared in accordance
24 with Formulation 2 by blending 2.9 parts of Zonyl 8740
25 (perfluoroalkyl methacrylic copolymer), 0.1 parts of
26 Dowicide A (sodium-orthophenyl phenol), 0.1 parts of
27 permethrin, 1.3 parts of Tergitol TMN-6 (2,6,8-trimethyl-4-
28 nonanol with ethylene oxide), 2.5 parts Dowanol DPM
29 (dipropylene glycol monomethyl ether), 2.5 parts Dowanol
30 DPnB (dipropylene glycol monobutyl ether), and 90.6 parts
31 water. The composition with the foregoing formulation
32 shall be referred to in this Example 1 and in Examples 2
33 and 3 as the "Aqueous Inventive Composition".

34 Three sections of carpet were selected. Each section
35 of carpet was the same style and color, and had a size of
36 about 23 inches by 46.5 inches. The sections of carpet
37 were new and not treated with any stain blockers. Using

1 spray bottles, the Solvent Inventive Composition was
2 applied to a first one of the sections, the Aqueous
3 Inventive Composition was applied to a second one of the
4 sections, and a control consisting of water was applied to
5 a third one of the sections. The application rates for
6 each of the compositions was about 20.97 ml per ft².
7 Following the application of the compositions to the
8 sections, each of the sections was rubbed with a plastic
9 sheet to assure proper coverage. The sections were then
10 allowed to dry for a period of 24 hours.

11 After drying, the backing of each of the sections was
12 marked with grid lines to make numbered squares that would
13 fit into 15 x 60 mm petri dishes. Three squares from each
14 of the sections were randomly selected using a random
15 number generator. The carpet squares were then cut from
16 the sections to provide a total of nine squares, three from
17 each section. The three squares from each section
18 constituted a "sample" of the composition applied to the
19 section.

20 Each square was placed in a petri dish and inoculated
21 with 40 adult American house dust mites. In each square,
22 the mites were inoculated in the center of the square
23 using a fine (000) brush. The petri dishes containing the
24 squares were then covered with paraffin lids and placed in
25 humidity chambers. The petri dishes containing the squares
26 were maintained in the humidity chambers at a relative
27 humidity of about 75% and at room temperature, i.e., about
28 70-75°F, for 96 hours.

29 After the 96 hour period, the acute mortality of the
30 American house dust mites in each sample was assessed using
31 a "heat escape procedure", wherein the petri dishes were
32 inverted (with paraffin lids facing down) and placed under
33 a 100 watt light source, such that the heat (@ 108°F)
34 generated by the light source would drive alive mites to
35 the paraffin lids. The surfaces of the paraffin lids were
36 then examined and the number of alive mites counted. This
37 heat escape procedure was performed a total of three times

1 on each petri dish of the sample, with a new paraffin lid
2 being used for each procedure. The squares in each petri
3 dish were then microscopically examined for mites. Mites
4 were scored as dead if they failed to move one body length
5 in response to gentle brushing. Mortality values were then
6 expressed as mean mortality for the three squares in the
7 sample, \pm standard error margin (SEM).

8 A t-test of proportions was performed to compare
9 mortality between the samples of the Solvent Inventive
10 Composition, the Aqueous Inventive Composition, and the
11 negative control. When the mortality of the house dust
12 mites in the samples of the Solvent Inventive Composition,
13 the Aqueous Inventive Composition, and the negative control
14 were compared by the studentized t-test of proportions
15 ($P < 0.05$), it was shown that the Solvent Inventive
16 Composition and the Aqueous Inventive Composition provided
17 significantly different results from the negative control
18 and each other. The results of the test were as follows:

	<u>Mortality, %</u>
19 Solvent-Based	
20 Inventive Composition	100 \pm 0.0
21	
22 Water-Based	72.5 \pm 5.2
23 Inventive Composition	
24	
25 Negative Control	10.8 \pm 0.8
26	
27	
28	
29	
30	

31 As shown by the above results, the Solvent Inventive
32 Composition and the Aqueous Inventive Composition both
33 provide effective control of dust mites. The Solvent
34 Inventive Composition provides especially good dust mite
35 control, having killed all of the dust mites in the sample,
36 which was a surprising and unexpected result.

37 Example 2

38 A water repellency test was performed to measure the
39 efficacy of the organic solvent-based and water-based
40 compositions of the present invention in repelling water.
41

1 The test was performed in accordance with a modified
2 version of the American Association of Textile Chemists and
3 Colorists (AATCC) Test Method 22-1989 Water Repellency;
4 Spray Test. Water repellency is defined by the AATCC as
5 the characteristic of a fibre, yarn, or fabric to resist
6 wetting.

7 The Solvent Inventive Composition was applied to a
8 piece of untreated cotton fabric, and the Aqueous Inventive
9 Composition was applied to another piece of cotton fabric.
10 Water was poured over the pieces of cotton fabric, and
11 their repellency was then evaluated. No sticking or
12 wetting of the upper surfaces of the pieces of cotton
13 fabric was observed.

14 As shown by the above results, the application of the
15 Solvent Inventive Composition and the Aqueous Inventive
16 Composition to substrates renders the substrates water
17 repellant.

18

19 Example 3

20 An oil repellency test was performed to measure the
21 efficacy of the organic solvent-based and water-based
22 compositions of the present invention in repelling oil.
23 The test was performed in accordance with AATCC Test Method
24 118-1992 Oil Repellency; Hydrocarbon Test. The test
25 utilizes standard test liquids consisting of a series of
26 hydrocarbons with varying surface tensions.

27 The Solvent Inventive Composition was applied to a
28 piece of cotton fabric, and the Aqueous Inventive
29 Composition was applied to another piece of cotton fabric.
30 Drops of the test liquids were applied to each piece of
31 cotton fabric. After each drop of test liquid was applied
32 to a piece of cotton fabric, the piece of cotton fabric was
33 observed for wetting, wicking, and contact angle. The
34 piece of cotton fabric was then given a grade number, which
35 was the highest number test liquid that did not wet the
36 piece of cotton fabric. Grade 0 is the lowest oil
37 repellency, while grade 8 is the highest oil repellency.

The piece of cotton fabric to which the Solvent Inventive Composition was applied was given a grade number of 6, while the piece of cotton fabric to which the Aqueous Inventive Composition was applied was given a grade number of 2. Grade 6 corresponds to n-decane, while grade 2 corresponds to a mixture of 65 volume percent of liquid paraffin and 35 volume percent of n-hexadecane.

As shown by the above results, the application of the Solvent Inventive Composition to a substrate will cause the substrate to repel most oils. The application of the Aqueous Inventive Composition to a substrate will cause the substrate to repel some oils.

Example 4.

A test was performed to measure the efficacy of the organic solvent-based composition of the present invention in controlling bacteria.

A plurality of organic solvent-based compositions, S1-S7, were prepared in accordance with Formulation 1 by blending 7.55 parts of Bartex AF NF (perfluorinated polymer), 0.1 parts of permethrin, 0.1 parts Dowicide 1 (ortho-phenylphenol), and varying amounts of Bardac 22 (didecyldimethylammonium chloride) and Isopar G (isoparaffinic solvent). The varying weight percents of Bardac 22 and Isopar G for the compositions were as follows:

<u>Composition</u>	<u>Bardac 22</u>	<u>Isopar G</u>
S1	0.0	92.25
S2	0.009	92.241
S3	0.019	92.231
S4	0.038	92.212
S5	0.075	92.175
S6	0.15	92.10
S7	0.3	91.95

A 0.5 m² sample of untreated, cotton-based upholstery fabric was cut into a plurality of 20mm X 20mm samples. Thirty-five samples were used in the test, a set of five

1 samples being used for each composition. Each set of
2 samples was immersed in its respective composition for
3 approximately 5 minutes. The sets of samples were then
4 removed and allowed to drain on an inclined surface. The
5 sets of samples were then transferred to sterile petri
6 dishes and allowed to stand overnight in a fume extraction
7 cabinet to dry thoroughly.

8 Three samples from each set were selected at random
9 and placed onto the surface of a Malt Extract Agar plate.
10 Thus, seven plates, with three samples in each plate were
11 used, one plate being used for each composition. Each of
12 the plates was then inoculated with an aliquot (100 μ l
13 spread uniformly over both the plate and the samples) of a
14 spore suspension of *Penicillium pinophylum* (IMI 114933: ca
15 10^7 spores per ml). The plates were then incubated at 24°C
16 for 5 days. The plates were then inspected for growth,
17 with the following results:

18		
19	<u>Comp.</u>	<u>Growth</u>
20		
21	S1	samples virtually overgrown
22	S2	samples partially overgrown
23	S3	some surface growth on samples
24	S4	surface growth restricted to edges of samples
25	S5	little surface growth, slight zone of inhibition
26	S6	no surface growth, moderate zone of inhibition
27	S7	no surface growth, significant zone of inhibition
28		
29		

30 As shown by the above results, the organic solvent-
31 based composition of the present invention has good
32 biocidal properties, which helps reduce food sources
33 available to dust mites.

34 While the invention has been shown and described with
35 respect to particular compositions thereof, those
36 compositions are for the purpose of illustration rather
37 than limitation, and other variations and modifications of
38 the specific compositions herein described will be apparent
39 to those skilled in the art, all within the intended spirit
40 and scope of the invention. Accordingly, the invention is
41 not to be limited in scope and effect to the specific

1 compositions herein described, nor in any other way that is
2 inconsistent with the extent to which the progress in the
3 art has been advanced by the invention.

WHAT IS CLAIMED IS:

- 1 1. A composition for treating a substrate to control
2 dust mites, said composition comprising a fluoropolymer, a
3 biocidally effective amount of a biocide, and an
4 acaricidally effective amount of an acaricide.
- 1 2. The composition of claim 1, wherein the acaricide
2 is a pyrethroid.
- 1 3. The composition of claim 2, wherein the acaricide
2 is permethrin; and
3 wherein the biocide is didecyldimethylammonium
4 chloride.
- 1 4. The composition of claim 3, wherein the
2 fluoropolymer is perfluorinated.
- 1 5. The composition of claim 1, further comprising an
2 organic solvent.
- 1 6. The composition of claim 1, wherein the biocide is
2 a quaternary ammonium compound and the biocidally effective
3 amount is about .05 to about 1 weight percent of the
4 composition.
- 1 7. The composition of claim 6, wherein the acaricide
2 is a pyrethroid and the acaricidally effective amount is
3 about .05 to about 3 weight percent of the composition.
- 1 8. The composition of claim 7, further comprising
2 about 81 to about 94.9 weight percent isoparaffinic
3 solvent; and
4 wherein the fluoropolymer comprises about 5 to about
5 15 weight percent of the composition.

1 9. The composition of claim 1, further comprising
2 about 66 to about 96.4 weight percent water, about .5 to
3 about 5 weight percent surfactant, and about 1 to about 10
4 weight percent glycol ether.

1 10. The composition of claim 9, wherein the biocide
2 is a quaternary ammonium compound and the biocidally
3 effective amount is about .05 to about 1 weight percent of
4 the composition.

1 11. The composition of claim 10, wherein the
2 acaricide is a pyrethroid and the acaricidally effective
3 amount is about .05 to about 3 weight percent of the
4 composition.

1 12. A composition for treating a substrate to control
2 dust mites, said composition comprising about .1 to about
3 20 weight percent of a fluoropolymer, about .001 to about 5
4 weight percent of a quaternary ammonium compound, and about
5 .01 to about 10 weight percent of a pyrethroid.

1 13. The composition of claim 12, wherein the
2 fluoropolymer is a perfluorinated polymer.

1 14. The composition of claim 13, wherein the
2 quaternary ammonium compound is didecyldimethylammonium
3 chloride.

1 15. The composition of claim 14, wherein the
2 pyrethroid is permethrin.

1 16. A method of treating a substrate to control dust
2 mites, said method comprising the step of applying a
3 composition to the substrate, wherein the composition
4 comprises a fluoropolymer and an acaricidally effective
5 amount of an acaricide.

1 17. The method of claim 16, wherein the composition
2 is in liquid form.

1 18. The method claim 16, wherein the composition is
2 in powder form.

1 19. The method of claim 16, wherein the composition
2 further comprises a biocidally effective amount of a
3 biocide.

1 20. The method of claim 19, wherein the acaricide is
2 permethrin.

1 21. The method of claim 20, wherein the biocide is
2 didecyldimethylammonium chloride.

1 22. The method of claim 16, wherein the composition
2 further comprises an isoparaffinic solvent.

1 23. The method of claim 16, wherein the composition
2 further comprises water.

1 24. The method of claim 22, wherein the acaricidally
2 effective amount of acaricide is about .05 to about 3
3 weight percent of the composition, the biocidally effective
4 amount of biocide is about .05 to about 1 weight percent of
5 the composition, the fluoropolymer comprises about 5 to
6 about 15 weight percent of the composition, and the
7 isoparaffinic solvent comprises about 81 to about 94.9
8 weight percent of the composition.

1 25. The method of claim 23, wherein the acaricidally
2 effective amount of acaricide is about .05 to about 3
3 weight percent of the composition, the biocidally effective
4 amount of biocide is about .05 to about 1 weight percent of
5 the composition, the fluoropolymer comprises about 2 to
6 about 15 weight percent of the composition, and water

7 comprises about 66 to about 96.4 weight percent of the
8 composition.

1 26. A method of treating a substrate to control dust
2 mites, said method comprising the step of applying a
3 composition to the substrate, wherein the composition
4 comprises a biocidally effective amount of a biocide, and
5 an acaricidally effective amount of an acaricide.

1 27. The method of claim 26, wherein the composition
2 further comprises a fluoropolymer.

1 28. The method of claim 27, wherein the biocide is a
2 quaternary ammonium compound and the biocidally effective
3 amount is about .05 to about 1 weight percent of the
4 composition; and

5 wherein the acaricide is permethrin and the
6 acaricidally effective amount is about .05 to about 3
7 weight percent of the composition.

INTERNATIONAL SEARCH REPORT

Int'l Application No

PCT/IB 99/01405

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A01N25/24 A01N53/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 97 24484 A (SOGILO) 10 July 1997 (1997-07-10) page 3, line 16 -page 5, line 17 claims 1-8	1,2,4,5, 9,16-28 3,6-8, 10-15
X Y	US 5 916 917 A (JANETTE SUH ET AL.) 29 June 1999 (1999-06-29) column 4, line 65 -column 9, line 40 example 1 -/-	26 3,6-8, 10-15

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

19 November 1999

Date of mailing of the international search report

30/11/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2250 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3018

Authorized officer

Fort, M

INTERNATIONAL SEARCH REPORT

Int. Application No.

PCT/IB 99/01405

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI Derwent Publications Ltd., London, GB; AN 1997-209183 XP002123254 KAO CORPORATION: "Household insecticidal compsn.-contains quaternary ammonium salt, and insecticide e.g. pyrethroid" abstract & JP 09 059109 A</p>	26
X	<p>DATABASE WPI Derwent Publications Ltd., London, GB; AN 1986-116639 XP002123255 SANYO MOKUZAI BOFU KK: "Insecticidal and ant controlling comps. contg. phosphate and/or pyrethroid insecticide and amine cpd. and/or quat. ammonium cpd." abstract & JP 61 057506 A</p>	26
A	<p>DE 42 31 010 A (VERLIEBTER ET AL.) 17 March 1994 (1994-03-17)</p>	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 99/01405

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9724484 A	10-07-1997	BE 1009900 A AU 1361897 A CZ 9702697 A DE 29622338 U EP 0812372 A ES 2113328 A FR 2742977 A JP 11501246 T NL 1004907 C NL 1004907 A NO 973939 A NZ 325161 A	07-10-1997 28-07-1997 18-02-1998 13-03-1997 17-12-1997 16-04-1998 04-07-1997 02-02-1999 19-01-1999 02-07-1997 27-08-1997 23-12-1998
US 5916917 A	29-06-1999	NONE	

THIS PAGE BLANK (USPTO)